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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/07/2005

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EXAMINER

LEE, JAE W

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/525,409	<b>Applicant(s)</b> KULOMAA ET AL.	
	<b>Examiner</b> Jae W. Lee, Ph.D.	<b>Art Unit</b> 1656	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 28-45 is/are pending in the application.
- 4a) Of the above claim(s) 35, 44 and 45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 28-34 and 43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Application status***

In response to the previous Office action, a non-Final rejection (mailed on 03/23/2007), Applicants filed a response and amendment received on 08/23/2007. Said amendment canceled Claim(s) 1-27, and added Claim(s) 28-45. Thus, Claim(s) 28-45 is/are at issue and present for examination.

Applicants' arguments filed on 08/23/2007, have been fully considered, and are deemed to be persuasive to overcome some of the rejections previously applied. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn.

The text of those sections of Title 35 U.S. Code not included in the instant action can be found in a prior Office action.

### ***Election***

Newly submitted claims 35-42, 44 and 45 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the previous election by Applicants was drawn to AVR 4 and 5 corresponding to SEQ ID NO: 6 and 7, respectively with mutations at positions 86, 106 and 117. However, newly added claims 35-42, 44 and 45 are drawn to AVR 4 and 5 corresponding to SEQ ID NO: 10 and 11, respectively with mutations at positions 84, 104, 115, and/or 122. Inventions of the original presentation and Inventions of newly added claims are unrelated.

Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions they are not disclosed as capable of use together, and have different amino acid sequences and mutations at different positions. Therefore, they are structurally distinct and have different modes of operation and effects.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 35-42, 44 and 45 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Objections to the Specification***

The previous objection to the specification for not complying with the rules set forth in 37 CFR 1.821(a)(1) and (a)(2), is withdrawn by virtue of Applicant's amendment, because Applicant's have inserted proper SEQ ID NOs in the Brief Description of Figures for the amino acid sequences appearing in Figures 4 and 9.

### ***Claim Objections***

The previous objection of Claims 12, 19, 24 and 27 for containing non-elected inventions, is withdrawn by virtue of Applicant's amendment because those claims have been canceled.

***Claim Rejections - 35 U.S.C. § 112***

The following is a quotation of the first paragraph of 35 U.S.C. § 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 28-34 and 43 are rejected under 35 U.S.C. § 112, first paragraph, written description, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The rejection was stated in the previous office action as it applied to previous claims 1, 6-10, 12, 14-16, 19, 22, 24, 25 and 27. In response to this rejection, Applicants have cancelled claims 1-27, added claims 28-45 in the amendment, and traverse the rejection as it applies to the newly amended claims.

Applicants point out the position of the previous Official Action, which rejected claims under this statute for not adequately describing the previously-recited genus of biotin-binding proteins. Also, Applicants allege that the specification does provide a sufficient description for AVR4/5 according to the previous Office Action. Therefore, Applicants assert that since the present claims are directed to AVR4/5, withdrawal of the rejection is respectfully requested.

Applicants' arguments have been fully considered but are not deemed persuasive for the following reasons. First, it is noted by the Examiner that nowhere in the previous Office Action, does the Examiner mention "the specification does provide a sufficient description for AVR4/5. Furthermore, claims as amended are still drawn to a genus of thermally stable avidin-related proteins AVR4/5 which has at least two intermonomeric disulfide bridges anywhere in the tetramer. In this case, the specification fails to describe (1) any identification of structural characteristics or properties of any avidin-related protein AVR4/5 having two or more intermonomeric disulfide bridges anywhere in the tetramer, and (2) how such a claimed genus of variant structures correlate to desired biological function/activity, i.e., an increase in the thermal stability of the tetramer. The claimed genus of "avidin-related proteins AVR4/5" encompasses widely variant species, having essentially any structure. Please refer to the M.P.E.P. section 2163 [R-5] under II, A, 3, (a), (ii) for more details with respect to sufficient number of representative species that should be disclosed to describe a widely variant genus. For the reasons provided herein and in the previous office action, the rejection under this statute is maintained.

Claims 28-34 and 43 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement, because the specification, while being enabling for chicken AVR mutants comprising SEQ ID NO: 6 or 7 having 1) a single mutation at amino acid position 117 to cysteine, 2) double mutation at amino acid positions 86 and 106 to cysteine, or 3) triple mutation at amino acid positions 86, 106

and 117, does not reasonably provide enablement for any thermally stable avidin-related protein AVR4/5 which has at least two intermonomeric disulfide bridges anywhere in the tetramer. Therefore, the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The rejection was stated in the previous office action as it applied to previous claims 1, 6-10, 12, 14-16, 19, 22, 24, 25 and 27. In response to this rejection, Applicants have cancelled claims 1-27, added claims 28-45, and traverse the rejection as it applies to the newly amended claims.

Applicants allege that the specification is enabling for AVR4/5 having mutations at amino acid positions 86, 106 and 117 according to the previous Office Action, but the specification does not provide enablement for any mutant of biotin-binding protein. Based on the newly added claims 28-45, which are directed to AVR4/5, SEQ ID NO: 11, which includes mutations at amino acid positions 84, 104 and 115, Applicants allege that claims 28-45 comply with the enablement requirement.

Applicants' arguments have been fully considered but are not deemed persuasive for the following reasons. First, it is noted by the Examiner that nowhere in the previous Office Action, does the Examiner mention that "the specification is enabling for AVR4/5 having mutations at amino acid positions 86, 106 and 117." Furthermore, claims as amended are still drawn to any thermally stable avidin-related protein AVR4/5 which has at least two intermonomeric disulfide bridges anywhere in the tetramer. With regard to the use of all "thermally stable avidin-related proteins AVR4/5," it is noted by

the Examiner that not all structurally different avidin-related proteins AVR4/5 would be able to form two or more intermonomeric disulfide bridges in the tetramer because each monomer requires specific mutations to cysteine at critical locations in order for two or more intermonomeric disulfide bridges to form a thermally stable structure tetramer. However, the disclosure of chicken AVR mutants comprising SEQ ID NO: 6 or 7 having 1) a single mutation at amino acid position 117 to cysteine, 2) double mutation at amino acid positions 86 and 106 to cysteine, or 3) triple mutation at amino acid positions 86, 106 and 117 is not commensurate with the breadth of claimed products encompassing all possible "thermally stable avidin-related proteins AVR4/5 which has at least two intermonomeric disulfide bridges anywhere in the tetramer." Therefore, for the reasons provided herein and in the previous office action, the rejection under this statute is maintained.

***Claim Rejections - 35 U.S.C. § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 28 and 43 are rejected under 35 U.S.C. § 102(a) as being anticipated by Laitinen et al. (Chicken avidin-related proteins show altered biotin-binding and physico-



chemical properties as compared with avidin, Biochem. J., First published on the Internet 24 April 2002, Vol 363, pp. 609-617).

The instant claims are drawn to a thermally stable avidin-related protein AVR4/5 which has at least two intermonomeric disulfide bridges in the tetramer.

The reference of Laitinen et al. specifically teach a chicken avidin-related proteins (AVR4/5), wherein two monomers are linked by a intermonomeric disulfide bond, thereby having at least two intermonomeric disulfide bonds in a tetramer (see Figure 3 on pg. 612 and related discussion on pg. 614, left column). Therefore, Claims 28 and 43 are anticipated by the teachings of Laitinen et al.

Notes on references related to prior art of the invention:

Chilkoti et al., Engineered Chimeric Streptavidin Tetramers as Novel Tools for Bioseparations and Drug Delivery, Biotechnology 13, 1198 - 1204 (1995).

### ***Conclusion***

Claims 28-34 and 43 are rejected for the reasons as stated above. No Claims are allowed. Applicants must respond to the objections/rejections in this Office action to be fully responsive in prosecution.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

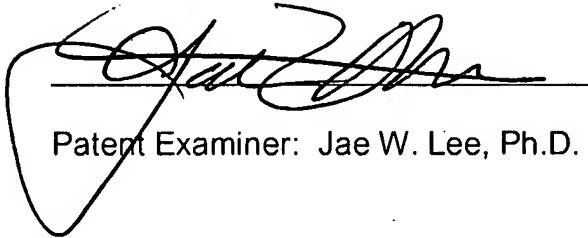
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jae W. Lee whose telephone number is 571-272-9949. The examiner can normally be reached on 8:00-4:30.

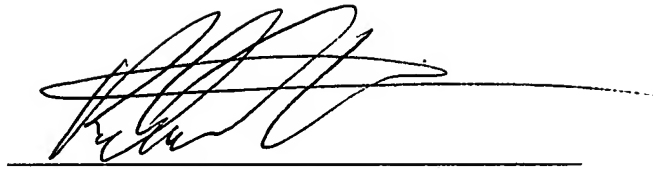
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kathleen K. Bragdon can be reached on 571-272-0931. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit: 1656



Patent Examiner: Jae W. Lee, Ph.D.



**RICHARD HUTSON, PH.D.  
PRIMARY EXAMINER**